6.1040: Software Design

Visual Design

Arvind Satyanarayan & Max Goldman

Fall'24

Usability criteria

Learnability
Efficiency
Error-tolarance
Pleasantness
Safety
Security
Accessibilty

Heuristics: † Physical

Fitts's law
Perceptual fusion
Gestalt principles
Mapping
Situational context
Accelerators
Typography

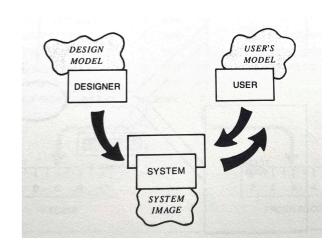
⚠ Linguistic

Speak the user's language Consistency Recognition vs. recall Information scent

Make things look aesthetically pleasing?

Yes! But also...

guide users by conveying structure, relative importance, relationships



Make things look aesthetically pleasing?

Yes! But also...

guide users by conveying structure, relative importance, relationships



Make things look aesthetically pleasing?

Yes! But also...

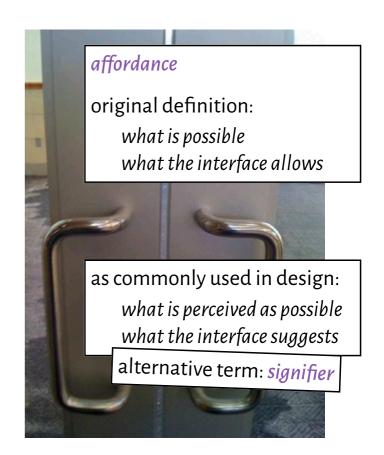
guide users by conveying structure, relative importance, relationships



Make things look aesthetically pleasing?

Yes! But also...

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Make things look aesthetically pleasing?

Yes! But also...

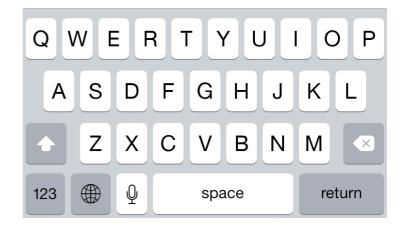
guide users by conveying structure, relative importance, relationships



Make things look aesthetically pleasing?

Yes! But also...

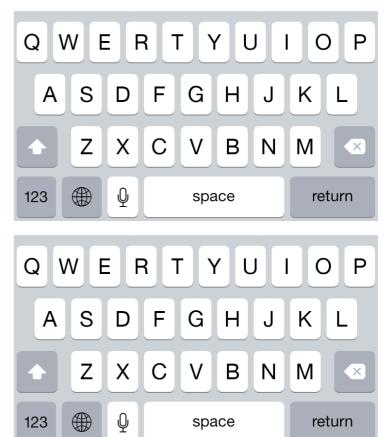
guide users by conveying structure, relative importance, relationships



Make things look aesthetically pleasing?

Yes! But also...

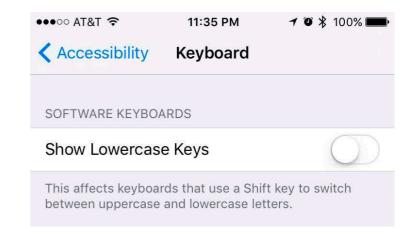
guide users by conveying structure, relative importance, relationships

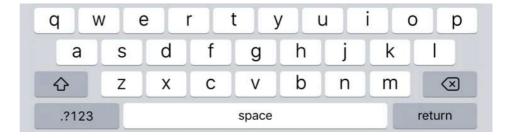


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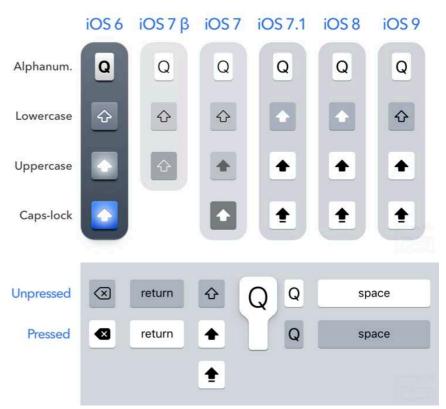




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Yes! But also...

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Make things look aesthetically pleasing?

Yes! But also...

guide users by conveying structure, relative importance, relationships

- ✓ Pleasantness
- ✓ Accessibilty
- ✓ Learnability
- ✓ Efficiency
- ✓ Safety
- ✓ and others as well

Figure / Ground

Proximity

Similarity

Symmetry

Connectedness

Continuity

Closure

Figure / Ground

Proximity

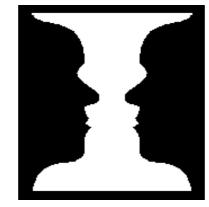
Similarity

Symmetry

Connectedness

Continuity

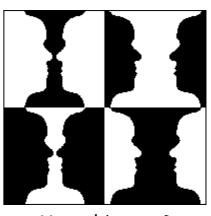
Closure



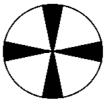
Ambiguous — vase or faces?



Surroundedness



Unambiguous?



Relative size

Figure / Ground

Proximity

Similarity

Symmetry

Connectedness

Continuity

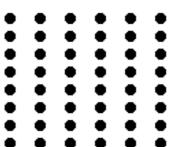
Closure

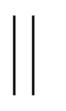


















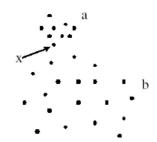


Figure / Ground

Proximity

Similarity

Symmetry

Connectedness

Continuity

Closure

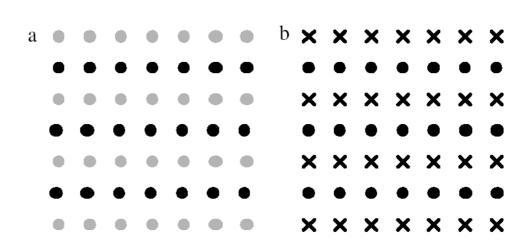


Figure / Ground

Proximity

Similarity

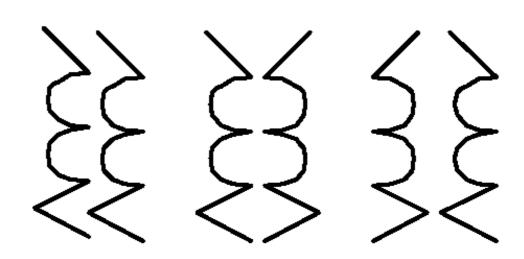
Symmetry

Connectedness

Continuity

Closure

Common Fate



Bilateral symmetry gives the strong sense of a figure

19 [Ware 2004]

Figure / Ground

Proximity

Similarity

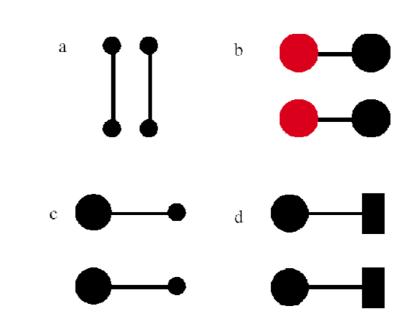
Symmetry

Connectedness

Continuity

Closure

Common Fate



Connectedness overrules proximity, size, color, shape, etc.

20 [Ware 2004]

Figure / Ground

Proximity

Similarity

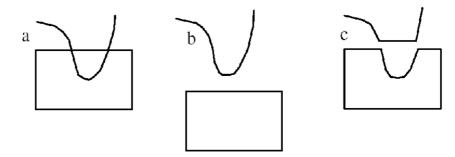
Symmetry

Connectedness

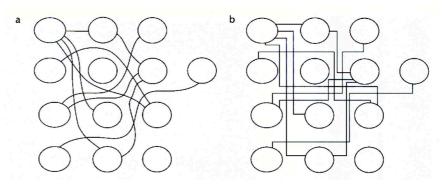
Continuity

Closure

Common Fate



Prefer smooth, not abrupt, changes



Connections clearer with smooth contours

21 [Ware 2004]

Figure / Ground

Proximity

Similarity

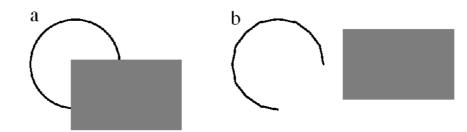
Symmetry

Connectedness

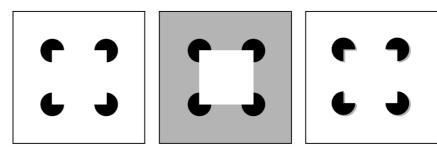
Continuity

Closure

Common Fate



Prefer closed, not broken, figures



Illusory contours

22 [Durand 2002] [Ware 2004]

Figure / Ground

Proximity

Similarity

Symmetry

Connectedness

Continuity

Closure

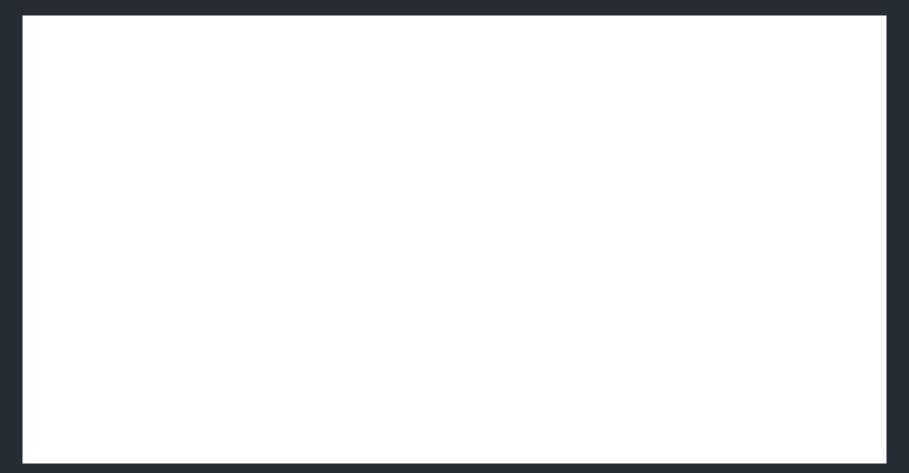


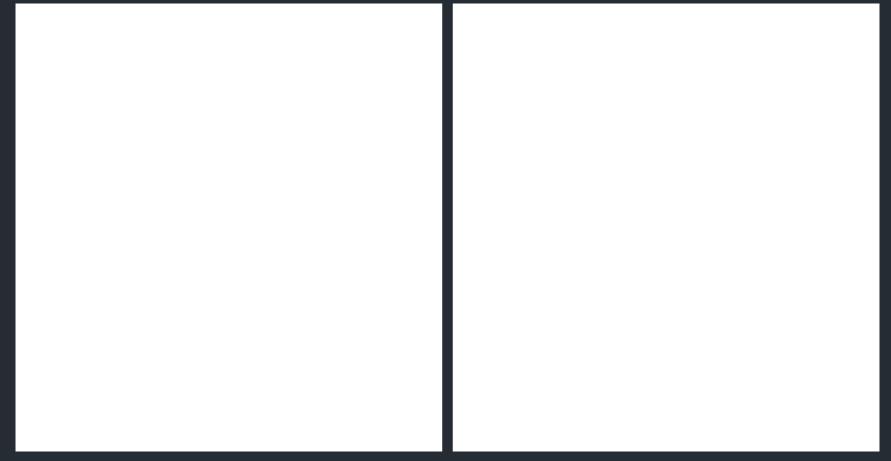
The elements of visual design

Layout

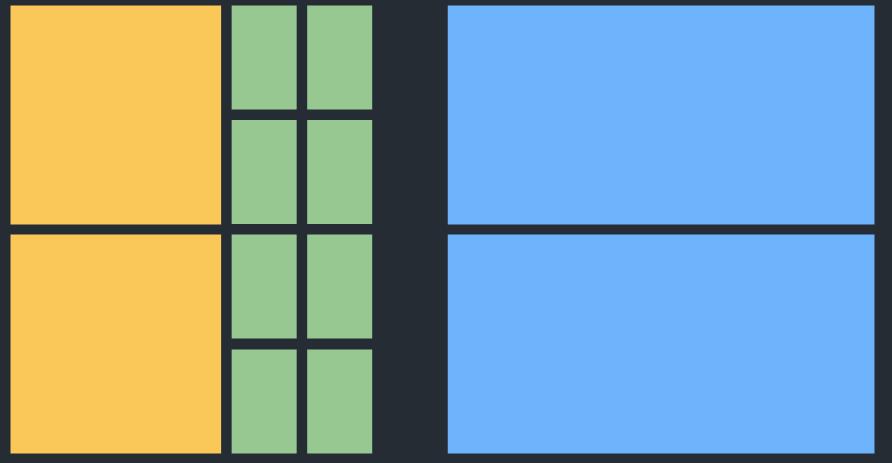
Typography

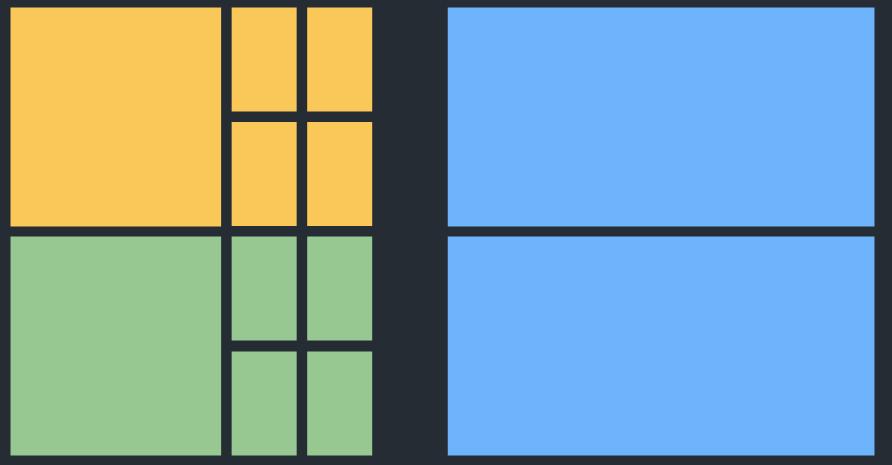
Color

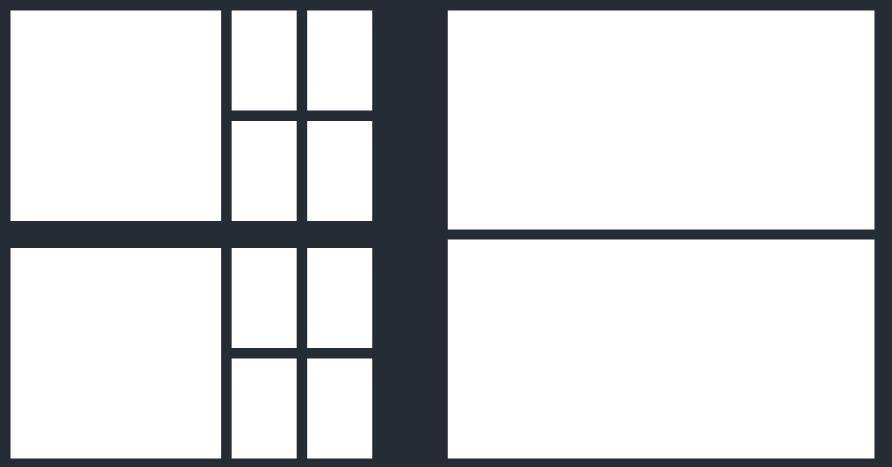












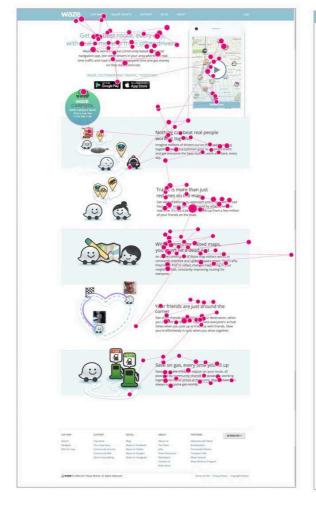
32

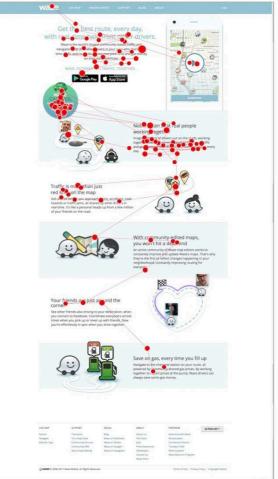
Information architecture

What is the structure of your application?

How do elements relate to each other?

How do users navigate it?







Eyetracking by Nielsen Norman Group nngroup.com NN/g

Grid system

Gutter/ Alley

Columns, often e.g. 12 for easy division into groups

ЗОрх 30px 30px 30px 30px 30px 30px 30px 30px Margin



The Washington Post

There's more to see.

Edition: U.S. & World | Regional

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Investigators have spoken to as many as 130 people in recent weeks, including senior officials who reported directly to Hillary Clinton while she was secretary of state, as well as others whose emails were at some point relayed to her inbox, according to current and former officials.

By Greg Miller, Greg Jaffe and Karoun Demiriian



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Democrats facing tough reelection bids privately told House Speaker Nancy Pelsoi that Intelligence Committee Chairman Adam Schiff needs to be the face of the probe.

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Hunter Biden attends the vice-presidential debate in 2012. (AP)

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Elections chief says GOP colleague barred wider distribution of foreign activity memo

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By Alex Horton



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Rep. Amodei

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Retropolis: The

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Impeachment isn't mandatory - even if Trump committed impeachable acts

By Keith E. Whittington



Llistened to dozens of Obama's calls. Trump knows that's perfectly normal.

By Joel Willett



Democrats' impeachment drama



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open, which tackles impeachment

(and features a surprise guest)



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still matter?

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"medically underserved."

By Eli Saslow



demonstration, creating chaos in downtown

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The Washington Post

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Last Updated:09/27/2019

By The Way

Detours with locals. Travel tips you can trust.



More City Guides Johannesburg Seattle Copenhagen Nashville Sydney Barcelona Minneapolis San Juan, Berlin Puerto Rico

Responsive grids

Bootstrap grid examples

Basic grid layouts to get you familiar with building within the Bootstrap grid system.

In these examples the .themed-grid-col class is added to the columns to add some theming. This is not a class that is available in Bootstrap by default.

Five grid tiers

There are five tiers to the Bootstrap grid system, one for each range of devices we support. Each tier starts at a minimum viewport size and automatically applies to the larger devices unless overridden.

.col-4	.col-4	.col-4
.col-sm-4	.col-sm-4	.col-sm-4
.col-md-4	.col-md-4	.col-md-4
.col-lg-4	.col-lg-4	.col-lg-4
.col-xI-4	.col-xl-4	.col-xl-4
.col-xxl-4	.col-xxl-4	.col-xxl-4

Three equal columns

col-md-4

Get three equal-width columns starting at desktops and scaling to large desktops. On mobile devices, tablets and below, the columns will automatically stack.

https://getbootstrap.com/docs/5.3/examples/grid/

Design critique

Structure:

"I like..."

"I wish..."

"What if ...?"



Design critique

Structure:

"I like..."

"I wish..."

"What if ...?"



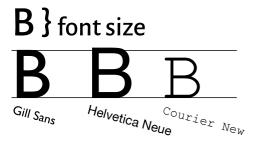
The elements of visual design

Layout

Typography

Color

Basic typographic definitions



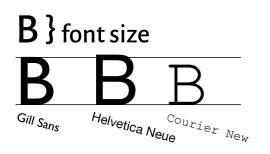
measured in points



Weight
light regular bold
thin semi-bold black



Basic typographic definitions



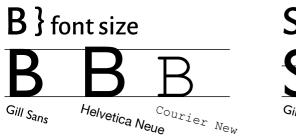


Six light regular bold thin semi-bold black



Alegreya Sans

Basic typographic definitions





Weight
light regular bold
thin semi-bold black

Alegreya (serif)
Alegreya Sans
IBM Plex Mono (e.g. WWW iii)

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Sample Text

The quick brown fox jumps over the lazy dog

Text Size

Activate Fonts Y

</> Add to Web Project

Activat nt

Activat nt

Activat nt

Activat nt

Activat nt

Activat nt

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Characters

ABCČĆDĐEFGHIIKLMNOPORSŠTU VWXYZŽabcčćdđefghijklmnopqrsš tuvwxyzžАБВГҐДЂЕЁЄЖЗЅИІЇЙЈК **ЛЪМНЬОПРСТЋУЎФХЦЧЏШЩЪ** ЫЬЭЮ Я абв г г д ђе ё є ж з ѕ и і ї й ј к л љ м н ьопрстћуў фхцчиш щъыь эюя АВГ ДЕ ΖΗΘΙΚΛΜΝΞΟΠΡΣΤΥΦΧΨΩαβγδεζ ηθικλμνξοπρστυφχψωά Άέ Έ έ Ή ί ϊ ΐ Ί ό ΌὐΰΰΥΫἀἀἐέἡἡἰίὸόὑὑὼώΏĂÂÊÔỞƯ ăâêôơư1234567890'?"!"(%)[#]{@}/& \<-+÷×=>® © \$ € £ ¥ ¢::.. *

Styles

Hello, 6,170



Hello, 6.170 Hello, 6.170 Hello, 6.170

Hello, 6.170 Hello, 6.170 Hello, 6.170

Hello, 6.170 Hello, 6.170

Hello, 6.170 Hello, 6.170

O DESELECT THIS FONT

Designer



Huerta Tipográfica is a collaborative Argentinian type foundry with a deep respect for design and typography. Founded in 2009, the company began as a place to meet, cooperate, and share experiences while collaborating on academic and commercial projects Huerta Tipográfica develops custom and retail fonts with libre, proprietary, or exclusive licenses, and is strongly committed to creating innovative and functional type. Their award-winning work has been recognized by Letter 2. Tipos Latinos, and the Bienal Iberoamericana de Diseño.

About

Alegreya was chosen as one of 53 "Fonts of the Decade' at the ATypl Letter2 competition in September 2011, and one of the top 14 text type systems. It was also selected in the 2nd Bienal Iberoamericana de Diseño, competition held in Madrid in 2010.

Alegreya is a typeface originally intended for literature. Among its crowning varied rhythm which facilitates the interpretation, but rather in a

The italic has just as much care and attention to detail in the design as the roman. The bold weights are strong, and the Black weights are really experimental for the genre. There is also a Small Caps

Not only does Alegreya provide great and harmonious text by means of

The Alegreva type system is a 'super and includes serif and sans serif sister





Adobe Fonts

Grid

28 fonts.

Alegreya Sans Thin </> The quick brown fox jumps over the lazy dog

Alegreya Sans Thin Italic </>

The quick brown fox jumps over the lazy dog

Alegreya Sans Light (/)

Alegreya Sans Regular </>

Alegreya Sans Italic (/>

characteristics, it conveys a dynamic and reading of long texts. Also, it provides freshness to the page while referring to the calligraphic letter, not as a literal contemporary typographic language.

sister family.

performance, but also achieves a strong elements designed in an atmosphere of

family', originally intended for literature,

The quick brown fox jumps over the lazy dog Activat nt Alegreya Sans Light Italic </> The quick brown fox jumps over the lazy dog

The quick brown fox jumps over the lazy dog

The quick brown fox jumps over the lazy dog

Alegreya Sans Medium </>

The quick brown fox jumps over the lazy dog

Popular Pairings with Alegreya

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Engineering Interactive Technologies	6.810
Principles and Practice of Assistive Technology	6.811
Intelligent Multimodal User Interfaces	6.835
Interactive Data Visualization & Society	6.C35/C85
Advanced Identity Representation	CMS.628/828
Imagination, Computation, and Expression Studio	.CMS.627/827

6.170	Software Studio
6.810	Engineering Interactive Technologies
6.811	Principles and Practice of Assistive Technology
6.835	Intelligent Multimodal User Interfaces
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6 170 Software Studio

Based on slides by Scott Klemmer

CMS.627/827 Imagination, Computation, and Expression Studio

6.170	Software Studio Jackson & Satyanarayan
6.810	Engineering Interactive Technologies Mueller
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Software Studio

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Principles and Practice of Assistive Technology

Miller, Greenberg, Keane

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6.835

Intelligent Multimodal User Interfaces

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6.C35/C85

Interactive Data Visualization & Society

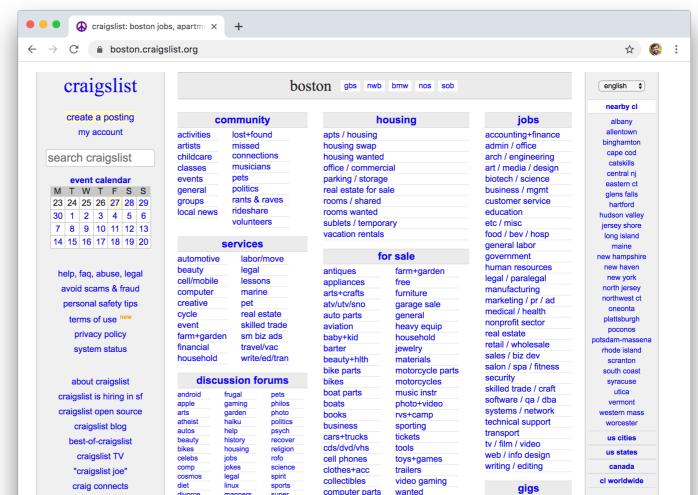
Design critique

Structure:

"Hike..."

"I wish..."

"What if. ?"



divorce

manners

super

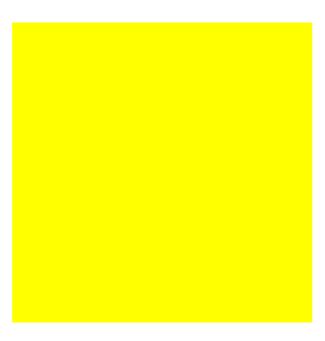
The elements of visual design

Layout

Typography

Color

What color is this?



What color is this?



"blue"

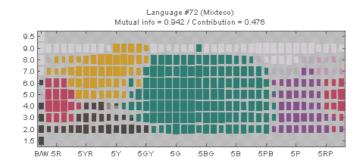
What color is this?

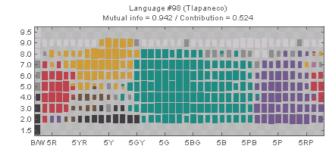


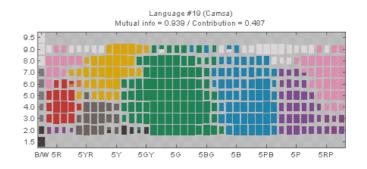
"teal"? "aqua"?

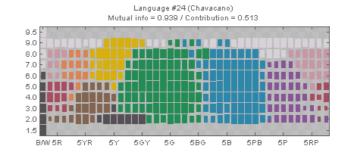
Color naming

Is color naming universal? Do languages evolve color terms in similar ways?

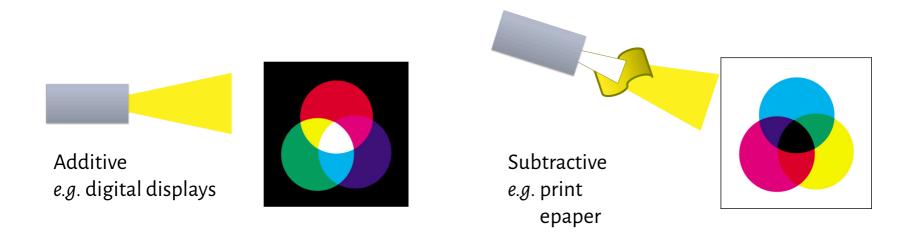




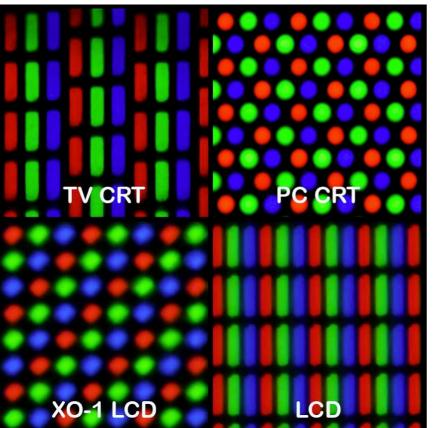




Additive and subtractive color



24-bit RGB color



8 bits each to describe amounts of red, green, & blue $2^8 = 256$ states each $256^3 \sim 16$ million colors

rgb(231, 69, 82) rgb(60%, 78%, 57%) #6eb4fd

So what's wrong with RGB?

Not how we naturally express or think about color

Not perceptually uniform

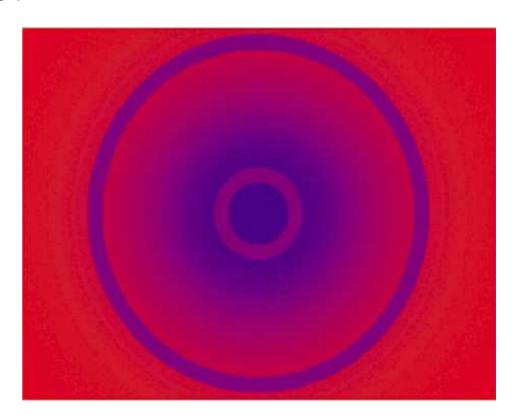




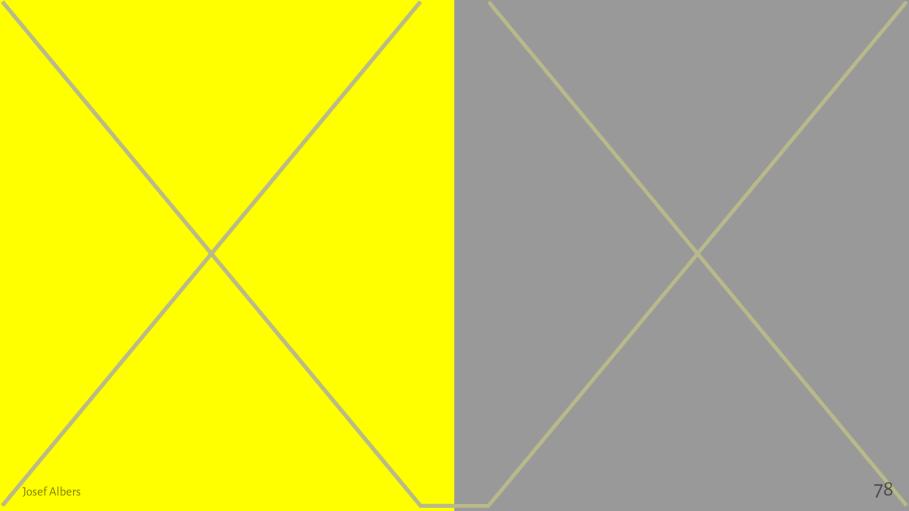
Simultaneous contrast

When two colors are side-by-side, they interact and affect our perception

The inner and outer purple rings are, in fact, the same display purple



Donald Macleod 77



Bezold effect

Color appearance depends on adjacent colors

E.g., adding a dark border around a color can make the color appear darker



6.C35/C85 Interactive Data Visualization & Society

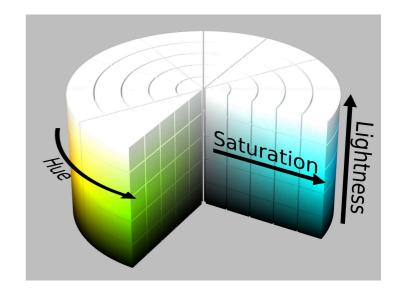
Hue, saturation, lightness

Hue: what we typically think of as the "color"

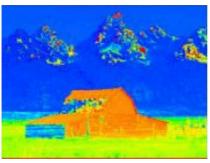
Saturation: the "colorfulness" of the hue ~ how much gray vs. color does it contain

Lightness: the brightness of the hue

~ how light vs. dark does it look









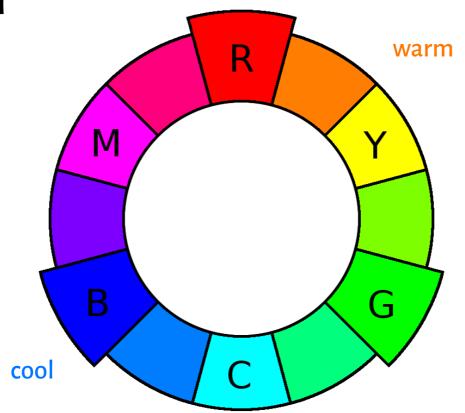


hue

saturation

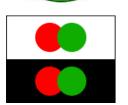
lightness

Color wheel



Color "harmonies"

Complementary



- ✓ High contrast
- ✓ Stands out, calls attention
- × Quite bad for text

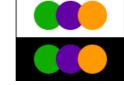
Analogous







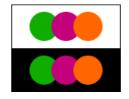
Triadic



- ✓ Pleasing, occur in nature
- → Choose one main color, others to support/accent
- → Make sure you have sufficient contrast

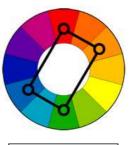
Split complementary





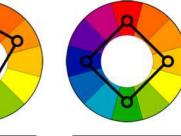


Rectangular



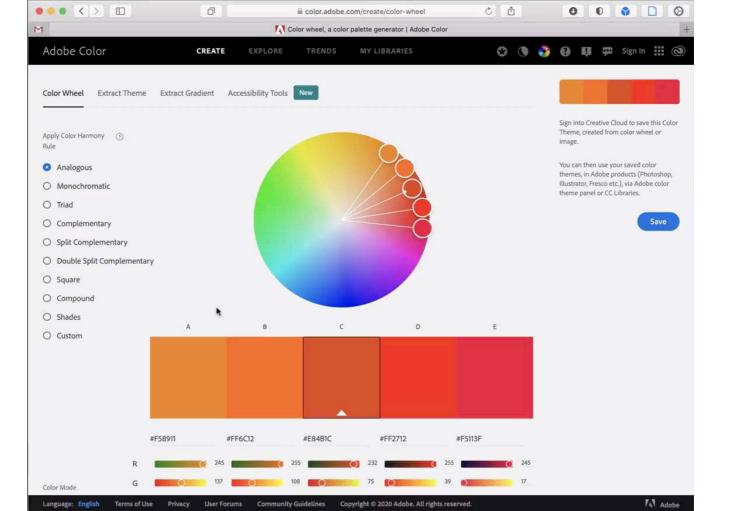








- ✓ Similar effect as complementary
- ✓ Easier to work with as adjacent colors introduce less tension



Today

Visual design

Guiding and pacing users

Gestalt principles

Figure/ground

Proximity

Similarity

Layout Typography Color

Looking ahead

User testing